

## THE NEUROPTEROUS GENUS PALPARES.

By NATHAN BANKS.

To the genus *Palpares* belongs the most magnificent of the Neuropterous insects. Their large size and contrasting markings has attracted even the collector of butterflies so that now a considerable amount of material exists in the various museums, a much more representative collection than any other group of exotic Neuroptera.

Having recently seen many of the collections and having a number of species in my own, I have endeavored to prepare a table with such notes as may be useful in identifying the various species.

Africa is the home of the genus, two species occur in Southern Europe, several in India and Persia, and one has been taken in the Madeira Islands. Elsewhere there are none, nor even a closely allied genus.

Several attempts have been made to divide the genus. Hagen made *Stenares* for those species in which the costal cells were crossed. This character is often variable in development, in many Myrmeleonidae, but in *Palpares* it appears to be more constant; the species of *Stenares* always have two rows of cells for most of the costal length, while in the true *Palpares* it is rare to find even one cell crossed. *Panexis* was created by Hagen for certain small, broad-winged species, the type of which has a thickened subcosta. Until better characters are given, it is best to keep *Panexis* as only a subgenus.

McLachlan proposed to divide both *Palpares* and *Stenares* according to whether the outer margin of the wings were strongly sinuated or not. Thus *Symmalthetes* is for species of *Palpares* with sinuated margin and *Crambomorphus* is for those *Stenares* with a sinuated margin. However as we know more species of *Palpares* it becomes increasingly difficult to tell whether the margin is strongly sinuated or not; thus *P. amitinus*, *P. insularis*, *P. inclemens* and *P. latipennis* all have the margin plainly sinuated, and other species show this character in a slight degree. Lately Navas has proposed various new genera. *Nosa* for *P. tigris* which has apparently two radial sectors, although in reality it has no more longitudinal veins than other Myrmeleonidae. *P. tigris* is so closely related by other characters to species with but one radial sector that I cannot

consider it generically different from *Palpares*. *Palparellus* was made by Navas for *P. spectrum*, but *P. ovampoanus* connects this group with the section of *P. flavofasciatus*.

*Golafrus* was made for *P. oneili* on account of the emargination at base of the fore wing. I suspect this character exists only in the male sex, besides *P. oneili* is otherwise related to *P. radiatus*.

If these names are to be used for subgenera, others should be created for other sections or groups. In the appended notes I have given certain facts regarding the anal venation which, although not sufficiently different to divide the genus, are fairly constant for each species. The color of the legs is valuable, and I tabulate the black and pale legged species below.

The color of the vertex and the presence of spots on thorax and on abdomen are also very useful. The point of origin of the radial sector in the fore wings is also useful; in *P. libelluloides* it is as far basad as the cubital fork, in many other species it is plainly beyond this point.

The palpi are variable in length according to the species; in *P. libelluloides* the last joint of the maxillary palpi is much longer than the space between the eyes, in *P. speciosus*, *P. moestus* etc., it is shorter. The male appendages also vary in length, but little in structure; in *P. speciosus* and allies they are very short, in *P. tigris* very long and with a basal tooth.

The markings of the wings, although variable in development, are extremely useful, especially the shape of the apical marks. It is doubtful if the character of median band across hind wing is of specific value. The size of species does not vary much, but the width of the hind wings does vary to some extent in the same species. The width of the face between the eyes is very narrow in *Palparellus* and the *flavofasciatus* group, in others wider. In the table I have placed a number of names as synonyms, based (in most cases) on my examination of the types, but I am quite certain that a still greater number should also be placed as synonyms, or at most varieties. All the species allied to *P. speciosus* are probably but forms of that species, for the marks are all on the same plan and the male genitalia the same. Likewise several species will later fall under *P. tristis* as collections are more extensive.

*P. cognatus* Rbr I have not seen, nor been able to place it; its habitat is unknown.

Arranged according to the color of legs they are as follows:

Legs all black, or pale on part of tarsi.

*speciosus*, *caffer*, *digitatus stuhlmanni*, *flavofasciatus*, *festivus*, *formosus*, *amitinus*, *insularis*, *spectrum* (and allies) *damarensis*, *tigroides*, *cataractæ*, *immensus*, *contrarius*, *pardaloides*.

Legs with pale on femora or tibiæ.

*libelluloides*, *hispanus*, *pardus*, *inclemens*, *latipennis*, *nyicanus*, *ægrotus*, *tristis*, *tigris*, *obsoletus*, *mæstus*, *interioris*, *angustus*, *oneili*, *sparsus*, *radiatus*, *tessellatus*, *furfuraceus*, *zebratus*.

The species may be arranged in the following groups:

*væltzkowi* group.

Includes also *obscuripennis*.

*mæstus* group.

Includes *cataractæ*, *martini* and *contrarius*.

*flavofasciatus* group.

Includes also *compositus*, *formosus*, *damarensis*, *bifasciatus*, *festivus*, and *elegantulus*.

*spectrum* group.

Includes also *rothschildi*, *astutus*, and *ovampoanus*.

*luteus* group (*Pamexis*).

Includes also *translatus* and *contaminatus*.

*speciosus* group.

Includes also *digitatus*, *caffer*, *varius*, *stuhlmanni*, and *dubiosus*.

*libelluloides* group.

Includes also *papilionoides*, *hispanus*, *percheroni* and *tessellatus*.

*solidus* group.

Includes also *walkeri*, and *angustus*.

*tigris* group (*Nosa*).

Includes also *ægrotus*, *ornatus*.

*pardus* group.

Includes also *tigroides*, *zebratus*.

*tristis* group.

Includes also *interioris*, *obsoletus klugi*, *extensus*, *lentus*, *similis*, *pardaloides*, *nigrita*.

*sparsus* group.

Includes also *sobrinus*, *furfuraceus*, *abyssinicus*, *nyicanus*.

*cephalotes* group.

Includes also *inclemens*, *incommodus*, *latipennis*, *radiatus*, *immensus*, *o'neili*, *astarte*, *patiens* (*infirmus*), and *karrooanus*.

*insularis* group.

Includes also *amitinus*.

*gigas* group.

No others known.

The African species are tabulated below, after which are the Indian species.

#### TABLE OF AFRICAN SPECIES.

- Hind margin of fore wings with a long emargination at base; wings narrow, streaked with dark..... *o'neili* Per.  
Hind margin not emarginate near base..... 2.
- Anterior apical margin of hind wings straight or slightly concave, tip acute; large heavily marked species the outer margin of wings sinuate... *gigas* Dal.  
Anterior apical margin of hind wings convex..... 3.
- Hind wings mostly black on the basal part before cubital fork as elsewhere; with only isolated pale spots..... 4.  
Hind wings largely pale, and pale on basal part before the cubital fork... 5.

4. Wings slender, acute at tips; hind pair with a pale apical streak.....  
*karrooanus* Per.  
 Wings broader, not acute; hind pair without apical streak; several isolated pale spots.....*waltzkowi* Weele
5. Vertex dark or blackish, legs wholly black.....6.  
 Vertex pale, with a median dark stripe, or at least outlined by pale spots.....26.
6. A large spot at or near the cubital fork in the hind wings.....16.  
 No spot near cubital fork in hind wings, the base being all pale.....7.
7. In hind wings the dark extends along the costa to base.....8.  
 In hind wings the dark does not extend to base, at most some isolated dark marks.....10.
8. Fore wings with large pale space in the middle, wings rather slender.....  
*ovampoanus* Per.  
 Fore wings without a large pale space in middle.....9.
9. Both wings with pale post-stigmal bands.....*spectrum* Rbr.  
 These bands broken into spots.....*rothschildi* Weele
10. Fore-wings dark, with black bands; hind wings with nearly two-thirds black with small white spots; expanse over 100 millimeters.....  
*obscuripennis* Sch.
11. Fore-wings yellowish or hyaline in pale areas.....11.  
 The subcosta of fore wings thickened near the stigma, wings yellow with dark bands, hind wings very broad.....*luteus* Thunb.  
 The subcosta of fore wings not thickened.....12.
12. Median band of hind wings does not reach up to the radius, but from middle of wing behind in form of three spots.....*contaminatus* Hag.  
 Median band of hind wings reaches across the wing from radius to hind margin.....13.
13. Apex of fore-wings dark with a distinct pale band before it.....14.  
 Apex without such marks.....15.
14. Dark bands of hind wings not connected.....*flavofasciatus* McLach.  
 Dark bands of hind wings connected.....*compositus* Navas.
15. Fore and hind wings with apical marks in the form of longitudinal streaks...  
*elegantulus* Per.  
 These marks not in the form of streaks, but band or spots...*festivus* Gerst.
16. Small very broad-winged species; greatest breadth of the hind wings much beyond the middle; basal band of the fore wings reaches to the hind margin.  
*translatus* Walk.  
 Larger; wings more slender; greatest breadth of hind wings at middle of length or before.....17.
17. Hind wings with the stigmal band broad and in front in two parts; wings not yellowish; basal band of hind wings nearly across, or in two nearly connected spots.....*cataractæ* Per.  
 Hind wings with the stigmal band entire on the front margin.....18.
18. Abdomen pale yellowish red; wings yellowish brown; small species; bands of hind wings narrow, apical mark in form of two streaks.....*bifasciatus* Oliv.  
 Abdomen pale on base, darker toward tip.....19.
19. Pronotum with yellow each side; fore wings often more or less yellowish, and the median and stigmal bands often only spots with dark borders; thorax very hairy, not showing the pale spots, male appendages very short...21.  
 Pronotum with two yellowish spots on front margin (maybe connected); pale median spots on thorax visible.....20.
20. Few spots between stigmal and median bands in fore wings; apical mark in form of streaks.....*damarensis* McL.  
 Many spots between bands; apical mark not in form of streaks.....*formosus* Bks.
21. Bands of hind wings connected together; apical mark of hind wings encloses but one pale spot.....*stuhlmanni* Kolb.  
 Bands of hind wings separate.....22.
22. In fore wings the small basal spots are arranged so as to leave two clear longitudinal streaks; stigmal and median bands of hind wings reach across with two or three fingers each; sides of pronotum more narrowly yellow.  
*digitatus* Gerst.  
 Basal spots of fore wings not arranged to leave clear spaces; sides of pronotum broadly yellow.....23.



23. Hind wings tessellate with spots along the hind border.....24.  
Hind wings not tessellate with spots along the hind border.....*dubiosus* Per.
24. Bands of hind wings reach across; wings rather more narrow.....*speciosus* L.  
Bands of hind wings do not reach across.....25.
25. Spots greatly reduced in size.....*varius* Nav.  
Spots of moderate size.....*caffer* Burm.
26. A large spot on the forking of the cubitus in the hind wing.....51.  
Only a small dot on this forking, but sometimes there are marks near by,  
above or around the forking.....27.
27. Hind margin of both wings narrowly, evenly fumose all along; stigmal spot  
of fore wings hardly reaches the radius; bands of hind wings not reaching  
across the wing.....28.  
Hind margin of the wings with at most separated dark spots; not evenly  
fumose all along, always some pale spaces.....30.
28. Fore wings with apparently two radial sectors arising close together; the  
lower of the apical spots is triangular; no band below antennæ.....*tigris* Dalm.  
Fore wings with but one radial sector; a black band below antennæ.....29.
29. Stigmal band of hind wings concave within; lower apical mark of fore wings  
hardly in form of two streaks.....*ornatus* Nav.  
Stigmal band of hind wings not concave within, often broken; lower apical  
mark of fore wings in form of two parallel, slightly curved streaks.....  
*ægrotus* Gerst.
30. Fore wings with many small dark spots, and no large spots or bands....31.  
Fore wings with large spots (perhaps netted) or bands.....35.
31. Hind wings with all small spots.....32.  
Hind wings with some moderately large spots.....33.
32. Longitudinal space behind the first branch of radial sector in fore wings pale,  
unmarked.....*sparsus* McLach.  
This space with spots as elsewhere.....*sobrinus* Per.
33. Vertex greatly swollen; thorax with fulvous hair; spots in hind wings mostly  
rounded.....*furfuraceus* Rbr.  
Vertex not so swollen; some spots in hind wings in the form of streaks....34.
34. Longitudinal space behind the first branch of radial sector in fore wings  
mostly unspotted.....*abyssinicus* K.  
This space with spots as elsewhere; hind wings with median spots, a spot or  
streak beyond and apical streaks.....*nyicanus* Kolbe.
35. Apical marks of hind wings in the form of longitudinal spots or streaks....36.  
Apical marks not so; transverse.....42.
36. A submarginal line in fore wings.....39.  
No such line; bands of hind wings not across.....37.
37. Bands of fore wings usually small and faint; hind margin of hind wings with  
long curved streaks reaching towards the bands; femora not spotted...  
*obsoletus* Gerst.  
Bands of fore wings distinct; hind margin of hind wings not so plainly  
streaked, mostly short spots; femora spotted.....38.
38. Larger, spots not broken up much; face mostly black; abdomen not striped.  
*tristis* Hag.  
Smaller, spots more broken up; the male appendages shorter; narrow band  
below antennæ; abdomen striped.....*interioris* Kolbe.
39. Stigmal mark in the hind wings divided, not reaching across; fore wings with  
an apical cloud.....*klugi* Kolbe.  
Stigmal mark in hind wing entire; fore wings with apical streaks.....40.
40. Stigmal mark of fore wings in form of a streak; stigmal band of hind wings  
not across.....*immensus* McL.  
Stigmal spot of fore wing band-like.....41.
41. Stigmal and median bands of hind wings not across.....*similis* Stitz.  
These bands reach across.....*reticulatus* Stitz.
42. Median band of hind wings with a projection toward the cubital fork, or else  
a separated spot near by; stigmal band with upper inner projection and  
also one behind.....43.  
No such projection to median band, nor a separated spot near by.....44.

43. Median band of hind wings has a projection toward the cubital fork; large species ..... *latipennis* Rbr.  
 Median band not with a projection, but a large spot near the cubital fork. .... *inclemens* Walk.
44. Fore wings with four distinct bands; hind wings with straight bands; no dots along hind border of either wing. .... *normalis* Nav.  
 Fore wings with but three bands; bands of hind wings not straight. .... 45.
45. Median and stigmal bands of hind wings connected. .... *amitinus* Kolbe.  
 Median and stigmal bands separated. .... 46.
46. Median band of hind wings reaches across; bands not netted. .... 47.  
 Median band does not reach across the hind wing. .... 49.
47. Stigmal band of two more or less connected bands; apical mark of fore wing entire; a large costal sub-basal spot dark; outer margin of wings plainly sinuate. .... *mæstus* H.  
 Stigmal band of but one band, perhaps with projections; no large sub-basal costal spot in fore wings. .... 48.
48. Apical mark of fore wings entire; inner projection of stigmal band of hind wings directed backward. .... *insularis* McL.  
 Apical mark of fore wings divided; inner projection of stigmal band of the hind wings directed upward. .... *lentus* Nav.
49. Bands netted; median band of hind wings with emargination on the inner side. .... *nigrita* Nav.  
 Bands not netted; hind wings rather broader in the middle. .... 50.
50. Fore wings with many moderate-sized spots; the stigmal band very small; no other bands; from Madagascar. .... *pardaloides* Weele.  
 Fore wings with only small dots and bands; median band of hind wings with an emargination on inner side; large spot on middle of hind margin. .... *geniculatus* Nav.
51. Abdomen yellow, each segment with a broad black transverse basal band; no longitudinal stripe; wings broad, fore wings much spotted; in hind wings the bands not across, or only by connected spots. .... *hispanus* L.  
 Abdomen with the segments not banded, sometimes lineate or spotted. .... 52.
52. Apical marks of hind wings in the form of two streaks. .... 53.  
 Apical mark of hind wings transverse or in spots. .... 57.
53. Stigmal band of hind wings not reaching across. .... 54.  
 Stigmal band of hind-wings reaching across. .... *cataractæ* Per.
54. All marks in the form of streaks in both wings. .... *radiatus* Rbr.  
 Some spots or bands. .... 55.
55. Spots netted; basal band of hind wings not reaching toward base; abdomen yellow with dark spots. .... *tessellatus* Rbr.  
 Spots not netted; basal spot usually reaching toward base. .... 56.
56. Four stigmal spots in hind wings. .... *incommodus* Walk.  
 Two stigmal spots in hind wings; a submarginal line in both wings. .... *immensus* McL.
57. Two stigmal bands in hind wings (or broken into spots); a submarginal row of spots. .... *cephalotes* Klug.  
 But one stigmal band in hind wings. .... 58.
58. Median band of hind wings reach across; small spots along hind border; abdomen dark, not spotted. .... 60.  
 Median band not across; hind wings with many small spots; abdomen yellow, lineate with dark. .... 59.
59. Abdomen with small spots and dots; bands of wings netted. .... *percheroni* Guer.  
 Abdomen lineate, or mostly dark; spots in hind wings not netted. .... *libelluloides* L.
60. Stigmal and median bands of hind wings connected; apical mark of hind wings entire. .... *walkeri* var.  
 These bands separated. .... 61.
61. The stigmal band of hind wings is connected or nearly so to the apical which extends along the hind border. .... 62.  
 The stigmal not connected to apical, and latter not extending along the hind border; hind wings very broad in the middle. .... *walkeri* McL.
62. Hind wings quite narrow; from North Africa. .... *angustus* McL.  
 Hind wings quite broad in middle; from Madagascar. .... *martini* Weele.

***Palpares gigas* Dalman.**

Figure—Plate XIX, Figure 17, and Drury, Pl. 41.

The fourth anal of f. w. with three or four branches and three cross-veins; the third anal in h. w. has a strong oblique vein up to second anal. Male appendages nearly twice as long as the last two segments together.

***Palpares moestus* Hag.**

Figure—Plate XIX, Figure 15; Hagen, Mozambique paper.

The fourth anal in f. w. with four or five branches and five or more cross-veins; the third anal of h. w. practically runs into the second, and with two or three cross-veins before it. The antennæ are longer than in *P. gigas*; the thorax with long white hair. Anal appendages of male, Fig. 55.

***Palpares obscuripennis* Schmidt.**

In general this resembles a very large *P. spectrum* but the fore wings are plainly tinged with pink; the pale basal part of hind wings is milky and the black has no complete pale bands, but median and stigmal pale bands reaching one-half way across wing, two spots near apex, and two to four near the hind border.

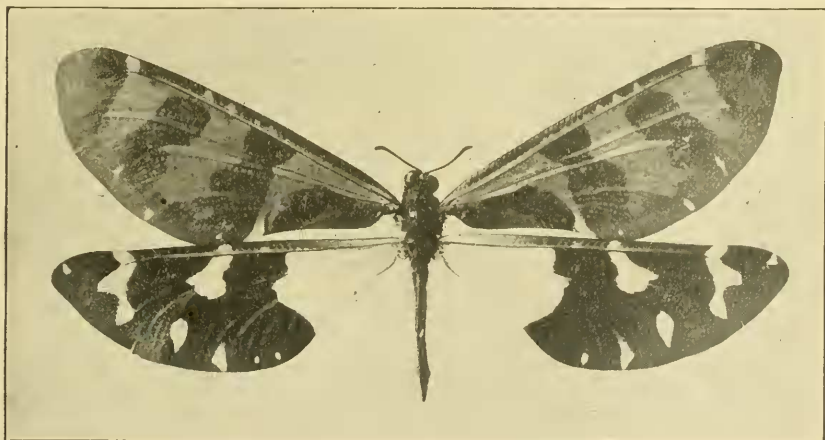


Fig. 1. *Palpares obscuripennis* Schmidt.

I have seen it only in the Stettin (type) and Berlin Museums. It may be the *P. fulvus* McLach; but I was not able to find McLachlan's type in his collection nor elsewhere.

***Palpares martini* Weele.**

Figure—Van der Weele, Madagascar, Figure 3.

This species resembles *P. walkeri*, and in that species the apical mark sometimes almost connects to the stigmal band.

**Palpares cataractæ** Pering.

Figure—Peringuey; and Stitz (as *obscuratus*).

Third anal in h. w. runs into the second, and is connected once or twice to the fourth anal.

This has been redescribed by Stitz as *P. inclemens* W. var. *obscuratus*.

**Palpares vœltzkowi** Kolbe.

Figure—Van der Weele, Madagascar, Figure 4.

A remarkable species, not only on account of the almost wholly black hind wings, but also in the very slender abdomen. Van der Weele figures (p. 255) the male appendages.

**Palpares insularis** McLach.

Figure—Van der Weele, Madagascar, Figure 6, also the male appendages on page 259.

Fourth anal of f. w. with three branches and one or two cross-veins to the third anal. Third anal of h. w. simple, two or three cross-veins to second, none to fourth anal. Black band below antennæ present.

*P. hildebrandti* is the same species.

**Palpares amitinus** Kolbe.

Figure—Van der Weele, Madagascar, Figure 7.

Fourth anal of fore wings long, with four branches and four or five connections to the third anal; third anal of hind wings simple, with two cross-veins to the second, none to the fourth. The legs are black; there is a large interantennal mark reaching much below the antennæ as well as above from eye to eye; the outer apical margin of the fore wings is slightly sinuated, as in several other species.

Van der Weele also figures (p. 262) the male appendages which are short like those of *P. speciosus*.

**Palpares furfuraceus** Rambr.

Figure—Navas (as *equestris*), Broteria, X, p. 56.

Readily known by the greatly swollen vertex and fulvous hair on thorax, which was noted by both describers. It occurs in West Africa.

**Palpares sobrinus** Pering.

Figure—Peringuey, 1911, p. 33, Figure 3.

I can find no differences between this species and *P. nudatus* Navas; but I have not seen the type of either species; but judge from the figures and descriptions.

**Palpares nyicanus** Kolbe.

Figure—Kolbe, original; and Peringuey, 1911, p. 32, Figure 1 (as *amulus*).

The third anal of h. w. runs apparently into the second, and with four or five cross-veins to the fourth anal.



*P. æmulus* Pering is, I think, the same species, and it is also figured by Calvert, Proc., Acad., Nat., Sci., Phil. 1899, plate X, fig. 2.

***Palpares abyssinicus* Kolbe.**

The third anal of h. w. is simple, and no cross vein to fourth.

This species is very close, if not identical, with *P. nyicanus*, the spots are arranged in oblique streaks.

***Palpares sparsus* McLach.**

Figure—Peringuey, 1911, p. 32, Figure 2.

The third anal of h. w. is simple, and no connection to fourth anal, but one to second. The fourth anal in f. w. is once or twice forked, and with two cross-veins. No band below antennæ.

***Palpares radiatus* Rambur.**

Figure—Rambur, original.

The fourth anal in f. w. with three or four branches, and two or three cross-veins; the third anal in h. w. runs into the second anal. The male appendages (Fig. 40) are curved and as long as the last segment, and enlarged a little at tip. There is no band under the antennæ.

There are but few specimens of this in European collections.

***Palpares incommodus* Walk.**

Figure—Plate XVIII, Figure 2, and by Stitz (*rubescens*) and by Navas (as *rieli*).

The third anal of h. w. appears to run into the second, two cross-veins behind to the fourth anal. In fore wings there is no line near the outer margin parallel thereto, but oblique streaks outward.

*P. costatus* Navas is also this same species as well as *P. rieli* and *P. rubescens* Stitz.

***Palpares latipennis* Rambur.**

Figure—Plate XVIII, Figure 1.

The fourth anal of f. w. has three or four branches and four or five cross-veins to the third anal. The third anal of h. w. is simple, with several cross-veins to the second and one or two to the fourth anal.

The *P. furfuraceus* of Walker (not of Rambur) is this species, Walker's identification of *P. cephalotes* is also this species. *P. prætor* Gerst. is this species.

***Palpares inclemens* Walk.**

Figure—Plate XVIII, Figure 5.

The third anal of h. w. runs into the second anal and with one or two cross-veins to fourth. The fourth anal of f. w. has three or four branches and four cross-veins to the third.

Sometimes the basal spot of hind wings is narrowly connected to the median. The wings especially the front pair are slightly sinuated on the outer margin.

**Palpares immensus** McLach.

Figure—Plate XIX, Figure 22, and Plate XXI, Figure 42.

Third anal of h. w. with a strong oblique cross-vein up to second, and a cross-vein behind to the fourth anal; fourth anal of f. w. with three or four branches and as many cross-veins; the third anal has but one fork.

*P. kalahariensis* Stitz is this species.

**Palpares cephalotes** Klug.

Figure—Klug; original description, and Plate XX, Figure 30 (*sollicitus*) and Figure 29 (*subducens*).

Third anal in h. w. simple, with two or three cross-veins to the second, and one to the fourth anal. No band under antennæ.

Walker's two species, *sollicitus* and *subducens* are *cephalotes* (as McLachlan has stated); the slight differences are only such as one finds in a series of many species of *Palpares*, *P. burmeisteri* Hagen (that is *P. cephalotes* Rambr) is probably the same species.

**Palpares karrooanus** Peringuey.

Figure—Peringuey, 1910, Plate VIII, Fig. 1.

Third anal in h. w. with one or two cross-veins to fourth anal; abdomen entirely reddish.

Although it has the hind wings almost wholly black as in *P. voeltzkowi* it is not related to that species, as all the marks are different; it is more nearly related to *P. radiatus*.

**Palpares oneili** Pering. (*Golafrus*).

Figure—Peringuey, 1911, p. 35, Figure 4.

Navas has made a new genus for it on account of the excised basal margin of the fore wings, but this is probably found only in the male, otherwise the species is related to *P. radiatus*. It was described as a female, but the tip of abdomen appears broken and the very narrow wings are similar to those of male *immensus*.

**Palpares similis** Stitz.

Figure—Calvert, (1889), Plate X, Figure 1.

This species is related to *immensus* by the submarginal line in fore wing, but the median and stigmal bands of hind wings are broader behind than in front; there is a spot above the cubital fork; in both wings the apical marks are in the form of streaks.

***Palpares reticulatus* Stitz.**

Figure—Navas, with original description (as *extensus*).

The third anal in h. w. has one cross-vein to the fourth anal. The description of Stitz seems to have the priority.

***Palpares obsoletus* Gerst.**

Figure—Plate XX, Figure 43, and Navas (as *nebulo*).

The fourth anal of f. w. has three or four branches and two connections to the third; in h. w. the third anal is simple, with one or two cross-veins to the second and none to the fourth. There is a black band below the antennæ.

***Palpares normalis* Navas.**

Figure—Navas, with original description.

I have not seen this species, but it appears to be good, so long as species are based on markings.

***Palpares geniculatus* Navas.**

Figure—Navas (with description.)

I have not seen it, but apparently distinct.

***Palpares klugi* Kolbe.**

Figure—Klug, Plate, Figure 3 (unnamed).

Fourth anal in f. w. with two branches and connected three times to third; the third in h. w. runs into second and then away, with a cross-vein before.

***Palpares tristis* Hag.**

Figure—Hagen, Mozambique and Kolbe. Plate XXI, Figure 51, appendages.

The fourth anal in f. w. has two or three branches, and two or three cross-veins; the third anal in h. w. simple, with a somewhat oblique cross-vein to the second anal. Nearly always there is a spot beyond the cubital fork in the h. w.

The varieties *niansanus* Kolbe, and *brevifasciatus* and *ugandanus* of Stitz are structurally very similar to the type form, but *brevifasciatus* is perhaps closer to *interioris*.

***Palpares interioris* Kolbe.**

Figure—Plate XXI, Figure 49.

The fourth anal of f. w. has two or three branches, and two or three cross-veins; the third anal of h. w. is simple, with two connections to the second. The marks are very similar to those of *obsoletus*, but that species is larger than *interioris*, and the body markings somewhat different.

***Palpares lentus* Navas.**

Figure—Plate XXI, Fig. 47, Navas, original description.

Third anal of h. w. simple, one cross-vein to the second, none to fourth anal. A black band below antennæ. Male appendages short, Fig. 36.

**Palpares pardaloides** Weele.

Figured by Van der Weele, Madagascar, Figure 5; also the male appendages on page 257.

Fourth anal of f. w. with four branches and two cross-veins; third anal of h. w. simple, no cross-vein to second. Legs deep black.

In the Brussels Museum is a long series from Madagascar that tends to connect this species to *P. insularis*.

**Palpares nigrita** Navas.

Figure—Plate XIX, Figure 27, and Navas, original.

Fourth anal in f. w. with two branches and two cross-veins; third anal of h. w. simple, and one straight cross-vein to the second anal. No band under antennæ.

*P. languidus* Navas appears also to go here, but the figure of the hind wing is broader than usual.

This is a species that stands in the Rambur collection with the label *P. manicatus* R., *P. tigris* Walk. var. *de tigris* Dalm, and also a label "Seneg" Rambur's *manicatus* according to him had two radial sectors like *tigris*, and with no locality label, so I cannot believe that this specimen is Rambur's type of *P. manicatus*. I figure the hind wing of this specimen, (figure 27).

**Palpares walkeri** McLach.

Figure—Plate XIX, Figure 21; Navas, Broteria X, p. 35.

Fourth anal of f. w. with two or three branches, and two cross-veins; third anal of h. w. simple, three or more cross-veins to second, and one to fourth. No band under antennæ.

*P. dispar* Navas seems to be the same species.

**Palpares angustus** McLach.

Figure—Plate XVIII, Figure 7.

Fourth anal in f. w. with three branches, and four cross-veins; third anal of h. w. has an oblique cross-vein to second and two cross-veins before it. Legs all deep black; the stigmal band of the hind wings sometimes has an upper inner projection. There is no band under antennæ.

The variety *oranensis* grades into the type.

**Palpares hispanus** Linn.

Figure—Navas, Insecta, 1911, p. 265.

The fourth anal of f. w. has one or two short branches and two cross-veins; the third anal of h. w. is simple, with an oblique cross-vein to second, but none to fourth. The marks on the abdomen (Fig. 33) are very characteristic; as in other species there is much variation in the extent of the marks on wings, and in the width of the hind wings.



***Palpares libelluloides* Linn.**

Figure—Many figures in European literature.

The fourth anal of f. w. is very short and curved, with one or two branches and one or two cross-veins. The third anal of h. w. is simple, with slightly oblique cross-vein to the second and none to the fourth anal.

*P. chrysopterus* Navas is the same or a slight variety.

***Palpares tessellatus* Rbr.**

Figure—Plate XX, Figure 32 (marks of abdomen), and Stitz (as *annulatus*).

The fourth anal of f. w. has two branches, and one or two connections; the third anal of h. w. is simple with one or two straight cross-veins. No dark band under the antennæ.

*P. annulatus* Stitz is a synonym of this species.

***Palpares percheroni* Guerin.**

Figure—Guerin, Iconog. Regn. Anim., Plate 62; Gray, Anim. Kingd., Plate 127, Figure 1.

The fourth anal of f. w. has two branches and one or no connection to third; the third anal in h. w. simple, with a somewhat oblique cross-vein to second anal. The male appendages are long and curved. The abdominal marks are figured on Plate XX, Figure 31.

***Palpares tigris* Dalm. (Nosa).**

Figure—Navas (*calceata*, *leonina*, *lupina*, *pardina*, and *hamatus*).

The fourth anal of f. w. has two or three branches and two or three connections to the third; the third anal of h. w. is simple, connected twice to the second and sometimes once to the fourth.

*P. manicatus* Rbr. is this species according to his description. *P. hamata* is a male. *P. tigris*, *calceata*, *hamata*, *sylphis* have quite large spots; *P. leonina*, *lupina* and *pardina* have smaller spots. Tip of fore wing, see figure 45.

***Palpares ægrotus* Gerst.**

Figure—Navas (as *longicornis*), Kolbe (as *submaculatus*), and Stitz (as *paucimaculatus*).

The fourth anal of f. w. with one or two branches and two connections to the third; third anal of h. w. simple, with one cross-vein to second, none to the fourth.

Variety *taborensis* Stitz is apparently the same. Tip of the fore wing, see figure 46. *P. dilatatus* Navas has stigmal spots united into a band.

***Palpares ornatus* Navas.**

Figure—Navas (with description).

Very close to *ægrotus* and perhaps a form of it, but the apical marks are different, and these in *ægrotus* seem very constant.

**Palpares speciosus** Linn.

Figure—Romer, *Genera*, Plate XXV, Figure 3; De Geer, *Mem.* III, Plate XXVII, Figure 9, (as *maculatus*); also Sulzer, Plate XXV, Figure 3.

The fourth anal of f. w. with two branches, and two cross-veins; the third anal of h. w. simple, with two cross-veins to second, but none to the fourth.

A peculiar variation in marking is seen on Plate XX, Fig. 37, hind wing; and male appendages Figs. 52, 53.

**Palpares dubiosus** Pering.

I have not seen this species nor is there any figure, but it is described as close to *P. speciosus*, so it is probably but one form of what will prove to be one common variable species.

**Palpares caffer** Burm.

Figure—Plate XXI, Figure 50.

The fourth anal of f. w. with two branches and two cross-veins to third; the third in h. w. simple, with one cross-vein to the second, but none to the fourth.

The difference between this and *P. speciosus* is hardly sufficient for a species, and not constant; the wings are usually shorter than in *P. speciosus*, and the fore pair less heavily marked.

**Palpares varius** Navas.

Figure—Navas, original description.

In fore wing the fourth anal has two branches and two connections; in hind wings the third anal is simple with two connections to second, but none to fourth.

**Palpares digitatus** Gerst.

Figure—Calvert, Figure 3 (unnamed); Navas (as *torridum* and *pobeguini*); and Plate XIX, Figure 24.

In fore wing the fourth anal has one branch and one cross-vein. Third anal in h. w. simple, not connected to fourth anal, with two veinlets to the second anal.

The figure I give and that of Navas represent heavily marked specimens; that of Calvert is more normal. I think *P. umbrosus* Kolbe is the same; but the bands are narrower and one or more "fingers" are usually separate from the bands, and the wings may be a little more slender, in fact it is more like *P. speciosus*, and appears to connect *speciosus* with *digitatus*. The hind wings of typical *umbrosus* are shown in figure 44.

***Palpares stuhlmanni* Kolbe.**

Figure—Kolbe, Figure 1.

Closely related to *P. speciosus*, at least in the male appendages; the marks are similar to those of *P. umbrosus*; the venation is as in *P. speciosus*

***Palpares damarensis* McLach.**

Figure—Plate XVIII, Figure 11, and Stitz (as *bifasciatus*).

Fourth anal in f. w. with two or three branches and two cross-veins; third anal of h. w. simple, no connection to the fourth. Black hair on clypeus; legs all black; head all dark, except pale clypeus.

***Palpares formosus* Banks.**

Figure—Plate XIX, Figure 23; also Navas in Broteria X, p. 85, Figure 16.

Fourth anal in f. w. with one short branch, and one cross-vein; third anal of h. w. simple with one cross-vein to second and none to the fourth.

***Palpares festivus* Gerst.**

Figure—Peringuey (as *mosambicus*), and Navas (as *latro*).

The third anal of h. w. simple, and no cross-vein to the fourth. Legs black.

***Palpares elegantulus* Pering.**

Figure—Peringuey 1910, Plate VII, Figure 4.

This small slender-winged species is apparently very distinct; I have not seen it, but it appears related to the *flavofasciatus* group.

***Palpares flavofasciatus* McLach.**

Figures—Peringuey (as *genialis*); Stitz (as *guttatus*); and Navas (as *nyassensis*)

The third anal in h. w. is simple and no connection to the fourth anal. Legs black.

In *P. nyassensis* the bands are a little wider than in the other types, but a series of specimens shows much variation in this point.

***Palpares compositus* Navas.**

Figure—Navas (and also as *mistus*).

Closely related to *flavofasciatus*, but with the bands of hind wings much broader and connected. *P. mistus* Navas appears to be the same form. It is in the Berlin Museum under a manuscript name that I cannot find has ever been published.

***Palpares bifasciatus* Oliv.**

Figure—Plate XVIII, Figure 6.

Fourth anal in f. w. with two branches, and two cross-veins; the third anal of h. w. simple, connected about four times to the second and twice to the fourth. A broad black band under antennæ; abdomen pale yellowish red; thorax with two rows of yellow spots.

This was considered by Walker as *P. pardalinus* Burm. McLachlan doubted it, and so named Walker's insect *P. brachypterus*; but Hagen (who saw both) asserts that Walker's insect is *pardalinus* B. It agrees with the *Mymeleon bifasciatum* Olivier.

**Palpares spectrum** Rambur.

Figure—Navas, Rev. Zool. Afric., II, p. 37.

The fourth anal of f. w. has two branches and two connections; the third anal of h. w. is simple, with one cross-vein to second, but none to fourth anal.

**Palpares rothschildi** Weele.

Figure—Stitz, Figure 10.

The fourth anal in f. w. has two branches and two connections; the third anal in h. w. is simple, and one cross-vein to second anal.

Very closely related to *P. spectrum* and probably but a local variety, occurring northward of the range of *P. spectrum*.

**Palpares ovampoanus** Pering.

Figure—Peringuey, 1910, Plate VII, Figure 1.

This is closely related to *P. spectrum* and will fall in the subgenus *Palparellus*. I have not seen specimens in European collections.

**Palpares translatus** Walk.

Figure—Plate XVIII, Figure 13.

The third anal in h. w. is simple, and not connected to the fourth anal. Antennæ close together at base; subcosta not thickened, but in general structure is closely related to *Pamexis luteus*.

**Palpares luteus** Thunberg. (*Pamexis*).

Figure—Plate XVIII, Figure 9.

The third anal in h. w. is simple, and connected once to the fourth anal.

*P. venosus* Burm. is the same; and Hagen asserts (and he has examined both types) that *P. conspuatus* Burm. is also the same species. The subcosta is thickened in both sexes, otherwise the species is related to *P. translatus*. There are specimens in the Berlin, Brussels and British museums.

**Palpares contaminatus** Hagen.

Figure—Plate XVIII, Figure 4.

This name was given by Hagen (Can. Entom. 1887, p. 112) for *P. pardalinus* Rambur, not of Burmeister. I figure the hind wing of the type. The subcosta of fore wing is not thickened.



## INDIAN SPECIES.

1. A large spot over the fork of the cubitus in the hind wing.....6.  
No such spot.....2.
2. An elongate spot along middle of hind margin of hind wing; median band does not reach across.....*tigroides*  
No such spot; median reaches across.....3.
3. Fore wings mostly dark, leaving only large and small pale spots, rather small species.....*astutus*  
Fore wings, mostly pale, with dark bands or spots.....4.
4. Margin of fore wings plainly sinuate; some bands of both wings reach across; large species.....5.  
Margin of fore wings not sinuate, bands of fore wings not across; hardly across in the hind wings.....*papilionoides*
5. Tips of hind wings plainly falcate; stigmal band without projection toward median band.....*falcatus*  
Tips not falcate; stigmal spot with projection toward the tip of the median band.....*contrarius*
6. Two parallel stigmal bands, or spots.....7.  
But one stigmal band, or broken into one series of spots.....9.
7. Both median and stigmal bands in hind wings reach across.....8.  
Neither median nor stigmal reach across; margins of both wings narrowly dark.....*astarte*
8. Median connected to basal spot; latter reaching across hind wing...*patiens*  
Median not connected to the basal, which does not reach across...*infirmus*
9. Apical mark of hind wings solid; stigma very broad and reaches across...*solidus*  
Apical mark with spots, or broken; stigmal band not very broad nor reaching across.....10.
10. A spot behind radius above the basal spot on the cubital fork of the hind wings; stigmal mark running obliquely inward.....*zebratus*  
No spot behind radius; stigmal band extending outward, or curved inward...*pardus*

*Palpares astarte* n. sp.

Figure—Plate XIX, Figure 18.

Head yellowish; a row of pale hairs across clypeus, and on margin of labrum; a black spot narrowing behind on vertex, continued over thorax as a median stripe, widest on the mesothorax, dark stripe on sides of pronotum, and stripe on meso and metathorax over base of the wings; abdomen yellowish brown, a black spot on apex of the first segment; legs and sternum all black. Wings rather yellowish, and with yellowish venation; costa black, and with black points out on costals, but costals are pale; outer posterior margin of both pairs of wings dark brown; fore wings with five series of spots; a long streak on cubitus broader at tip and bending down; a spot above it behind the radius; an oblique band beyond the streak reaching from radius to more than one-half way across; beyond this are two spots in an oblique row; then three spots in a transverse row, one stigmal, the other two in form of streaks; the two subapical marks are not quite streaks. In hind wings is a spot on cubital fork, a band beyond reaching to beyond middle where it is enlarged; a curved band beyond this, not reaching either radius or hind margin, larger behind; then two large spots, one stigmal, the other close behind it; then a sinuous band before apex. Wings of moderate breadth; in fore wing the third anal is connected to the fourth four or five times, in hind wings the third anal has an oblique vein running into the second anal, and one cross-vein beyond it. Expanse 125 mm.

From Chapra, Bengal, India (Mackenzie).

**Palpares pardus** Rambr.

Figure—Plate XVIII, Figure 3, and anal appendages, Plate XXI, Figure 54.

The fourth anal of f. w. has three or four branches and three cross-veins; the third anal in h. w. is simple, with two cross-veins to second.

*P. expertus* Walk is the same species; it is very common in India.

**Palpares zebratus** Rambr.

Figure, Plate XX, Figure 28.

The third anal of h. w. simple, with two to four cross-veins to second and one to three to fourth anal. Abdomen with a median dark stripe above. The fore wings are without distinct bands, but with median and stigmal spots.

**Palpares contrarius** Walk.

Figure—Plate XVIII, Figure 8.

The third anal of h. w. simple, with two cross-veins to the second, one of which is slightly oblique, in the f. w. the fourth anal has two branches and two or three connections.

This is a beautiful species not uncommon in Ceylon. In Walker's description a line is omitted regarding the second band in the hind wings, for it is this band that has a projection toward the first band.

**Palpares falcatus** McLach.

Allied to *contrarius* in markings, but hind wings more falcate; I have seen only the type.

**Palpares patiens** Walk.

Figure—Plate XVIII, Figure 10, and Navas in Broteria X, p. 86, Figure 17.

The third anal of h. w. runs into the second, and a cross-vein behind to fourth anal; abdomen dark, unmarked.

**Palpares infirmus** Walk.

Figure—Plate XVIII, Figure 12.

The third anal of h. w. with an oblique vein to the second, one cross-vein before it to second, and one behind to fourth anal. No band under antennæ.

This is probably the same species as *P. patiens*. Fore wings with many spots, and streaks and spots along the outer hind margin, stigmal and median bands small.

**Palpares papilionoides** Klug.

Figure—Klug, Plate, Figure 2.

The third anal in h. w. is simple, no cross-vein before the oblique one running into second.

It is not common and is represented in but few European collections.

***Palpares solidus* Gerst.**

Figure—Plate XIX, Figure 20; and Navas (as *klapaleki*).

The fourth anal in f. w. is two or three branched, and with two or three connections; the third anal in h. w. is simple, with one cross-vein to second.

***Palpares tigroides* Walk.**

Figure—Plate XX, Figure 34.

Third anal of h. w. simple, one cross-vein to the second and none to fourth anal. Legs black; fore wings with hardly any marks, rather yellowish.

***Palpares astutus* Walk.**

Figure—Plate XIX, Figure 19.

The fourth anal of f. w. with two branches, and two cross-veins; the third anal of h. w. simple, with one cross-vein to second. It belongs to the subgenus *Palparellus*.

## STENARES.

(including *Crambomorphus*.)

1. Outer margin of wings strongly sinuate.....(*Crambomorphus*) 2.
- Outer margin of wings not plainly sinuate.....(*Stenares*) 3.
2. Hind wings pale with two large bands well separated, and apex marked....  
*grandidieri* Weele.
- Hind wings with the bands so large they are connected and cover most of surface, leaving only pale spots.....*sinuatum* Oliv.
3. Hind wings with all the bands broad and connected, leaving only pale spots....  
*madagascariensis*.
- Hind wings not so heavily marked.....4.
4. No stigmal spot in hind-wings, a streak along outer edge, and sometimes a few dots before it; wings very narrow; in hind wings costals at base are crossed.  
*hyaena*.
- A stigmal spot reaching nearly one-half way across.....5.
5. A spot on hind wings just beyond the cubital fork, also large median band; wings broad; in hind wings the costals are mostly simple.....*irroratus*.
- No spot on hind wings near the cubital fork, but median spots (or band) are sometimes present; in the hind wings the costals are mostly crossed....6.
6. Larger; apical mark of the hind wings in the form of two streaks....*improbus*.
- Smaller; apical mark of the hind wings entire, or partly broken, not in form of streaks.....*harpyia*.

In *S. hyaena*, *irroratus*, *improbus* and *harpyia* the third anal of h. w. runs into the second, with one or three cross-veins before; all have a pale pronotum with a median black stripe, and all have black legs.

***Stenares (Crambomorphus) grandidieri* Weele.**

Figure—Weele, Madagascar, Fig. 2.

Differs much in markings from *S. sinuatus*; fully half of the hind wing is hyaline; the wings are also much broader than in that species, but the hind wing shows the same costal swelling at apex. The anal venation is similar to that of *S. sinuatus*, but in the h. w. the third anal has but one cross-vein to the fourth anal.

**Stenares (Crambomorphus) sinuatus** Oliv.

Figure—Plate XIX, Fig. 14.

Hind wings black; two pale spots in middle and stigma pale, and pale spots on hind border.

Fourth anal in f. w. has four branches and four connections; in h. w. the third anal is long, with an oblique cross-vein to the second and others nearly erect, and four cross-veins to the fourth anal.

*Palpares hematogaster* Gerst. is the same species.

**Stenares irroratus** Navas.

Figure—Navas, original.

I have seen only the type in the British Museum.

**Stenares improbus** Walk.

Figure—Plate XIX, Figure 16, and male appendages, Figure 25.

In h. w. the third anal runs into the second, and has two cross-veins to fourth; in f. w. the fourth anal has five branches and five cross-veins to the third.

**Stenares harpyia** Gerst.

Figure—(Anal appendages) Plate XIX, Fig. 26.

The fourth anal of f. w. has many branches and many connections to the third anal; in h. w. the third anal runs into the second, and has two branches.

**Stenares madagascariensis** Weele.

Figure—Van der Weele, Madagascar, Fig. 1.

The third anal of hind wing is simple, with an oblique cross-vein to second and two or three before it, and four or five cross-veins to the fourth.

**Stenares hyæna** Dalman.

Hagen considers the figure 12, plate 86, of the Fourth volume of Seba's *Thesaurus* as representing the species.



## EXPLANATION OF PLATES XVIII TO XXI.

- Fig. 1. *Palpares latipennis*, hind wing.  
 Fig. 2. *Palpares incommodus*, hind wing.  
 Fig. 3. *Palpares pardus*, hind wing.  
 Fig. 4. *Palpares contaminatus*, hind wing.  
 Fig. 5. *Palpares inclemens*, hind wing.  
 Fig. 6. *Palpares bifasciatus*, hind wing.  
 Fig. 7. *Palpares angustus*, hind wing.  
 Fig. 8. *Palpares contrarius*, hind wing.  
 Fig. 9. *Pamexis luteus*, hind wing.  
 Fig. 10. *Palpares patiens*, hind wing.  
 Fig. 11. *Palpares damarensis*, hind wing.  
 Fig. 12. *Palpares infirmus*, hind wing.  
 Fig. 13. *Palpares translatus*, hind wing.  
 Fig. 14. *Stenares sinuatus*, hind wing.  
 Fig. 15. *Palpares mœstus*, apex of hind wing.  
 Fig. 16. *Stenares improbus*, hind wing.  
 Fig. 17. *Palpares gigas*, apex of hind wing.  
 Fig. 18. *Palpares astarte*, fore and hind wings.  
 Fig. 19. *Palpares astutus*, fore and hind wings.  
 Fig. 20. *Palpares solidus*, hind wing.  
 Fig. 21. *Palpares walkeri*, hind wing.  
 Fig. 22. *Palpares immensus*, hind wing.  
 Fig. 23. *Palpares formosus*, hind wing.  
 Fig. 24. *Palpares digitatus*, hind wing.  
 Fig. 25. *Stenares improbus*, male appendage.  
 Fig. 26. *Stenares harpyia*, male appendage.  
 Fig. 27. *Palpares nigrita*, hind wing.  
 Fig. 28. *Palpares zebratus*, hind wing.  
 Fig. 29. *Palpares subducens* hind wing.  
 Fig. 30. *Palpares sollicitus*, hind wing.  
 Fig. 31. *Palpares percheroni*, abdomen.  
 Fig. 32. *Palpares tessellatus*, abdomen.  
 Fig. 33. *Palpares hispanus*, abdomen.  
 Fig. 34. *Palpares tigroides*, hind wing.  
 Fig. 35. *Palpares latipennis*, and *amitinus*, anal area of fore wings.  
 Fig. 36. *Palpares lentus*, male appendages.  
 Fig. 37. *Palpares speciosus*, variation of hind wing.  
 Fig. 38. *Palpares insularis*, anal area, fore wing.  
 Fig. 39. *Palpares inclemens*, anal area, hind wing.  
 Fig. 40. *Palpares radiatus*, male appendages.  
 Fig. 41. *Palpares umbrosus*, male appendages.  
 Fig. 42. *Palpares immensus*, male appendages.  
 Fig. 43. *Palpares obsoletus*, hind wing.  
 Fig. 44. *Palpares umbrosus*, hind wings, of two males.  
 Fig. 45. *Palpares tigris*, apex of fore wing.  
 Fig. 46. *Palpares ægrotus*, tip of fore wing.  
 Fig. 47. *Palpares lentus*, hind wing.  
 Fig. 48. *Palpares extensus*, hind wing.  
 Fig. 49. *Palpares interioris* hind wing.  
 Fig. 50. *Palpares caffer*, hind wing.  
 Fig. 51. *Palpares tristis*, male appendage.  
 Fig. 52. *Palpares speciosus*, male appendage, side.  
 Fig. 53. *Palpares speciosus*, male appendage, above.  
 Fig. 54. *Palpares pardus*, male appendage.  
 Fig. 55. *Palpares mœstus*, male appendage.